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Comparative Study of Preloading with Ringer Lactate and Intravenous Ephedrine for Prevention of Hypotention during Propofol Induction in Patient Undergoing Elective Abdominal Surgery under General Anaesthesia.

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Abstract

Background: Propofol is ideal induction agent for short and ambulatory surgical procedures requiring general anaesthesia, as recovery is rapid with fewer unwanted side effects, such as drowsiness on recovery, disorientation and nausea, when compared with other agents such as Thiopentone.

In this study compared the efficacy of preloading with Ringer Lactate (crystalloid) with IV Ephedrine Sulfate (Vasoconstrictor) in prevention of hypotension during Propofol induction.

Method: Prospective, randomised observational study including 90 patients of ASA physical status I and II, 20 to 50 yrs age of both gender, scheduled for elective abdominal surgery, were assigned by pre randomized, sealed envelopes into three study groups and receive the following: Group C(n=30) :inj. Propofol (2mg/kg),Group **E(n=30):inj.** Propofol (2mg/kg) and inj.Ephedrine 70 ug/kg, **Group RL(n=30): inj.Propofol** (2mg/kg) and inj. Ringer Lactate(10ml/kg).

Heart rate, Blood pressure (SBP,DBP,MAP) were recorded before induction (baseline) and immediate, 01min.,03min., 05min.post induction.

Results: Preoperative Ephedrine Sulphate failed to prevent the delayed post induction hypotension and led to excessive increase in the heart rate that may not be tolerated in the high risk patients. On the other hand, preoperative volume loading with 10ml/kg Ringer Lactate over 10-15 min successfully antagonised Propofol induced hypotension without increments in the heart rate. Therefore, volume loading with Ringer's Lactate provides more haemodynamic stability than the pre-induction administration of Ephedrine Sulphate.

Conclusion: Preoperative Ephedrine Sulphate failed to prevent the delayed post induction hypotension and led to excessive increase in the heart rate that may not be tolerated in the high risk patients.

Keywords: Propofol, hypotension, Ephedrine, Ringer Lactate, blood pressure, heart rate.

Introduction

Propofol (2, 6 diisopropylphenol) is a rapidly acting i.v. anaesthetic agent that has gained wide acceptance for the induction and maintenance of general anaesthesia. Propofol is ideal for short and ambulatory surgical procedures requiring general anaesthesia, as recovery is rapid with fewer unwanted side effects, such as drowsiness on recovery, disorientation and nausea, when compared with other agents such as thiopentone. The induction of general anaesthesia with propofol, however, has been associated with a decrease in systolic arterial blood pressure,[1,2,3] especially in patients with advanced age (>50 years), prior hypotension (mean arterial pressure <70mmHg) and higher American Society of Anaesthesiologists' Physical Status (ASA-PS) class (> II). [4,5,6,7] .The hypotensive effect of propofol has been attributed to decrease in systemic vascular resistance[1,8] and /or in cardiac output [9] caused by a combination of arterial and venous vasodilation[1,10] impared baroreceptor reflex mechanism[11] and depression of myocardial contractibility[12,13].

Preloading with crystalloids (like Ringer Lactate) prevents hypotension by increasing venous return and filling pressure of the right atrium and left ventricle to augment cardiac output but can have many disadvantages including long administration time, risk of haemodilution, fluid overload. Similarly sympathomimetics (like ephedrine) prevent and correct hypotension by increasing peripheral vascular resistance and/or cardiac contractility with their advantages of low cost and ease of administration. But they also have disadvantages such as tachycardia and increased risk of arrhythmias with concomitant use of volatile anaesthetics[14].

The aim of the present study was to compare the three different regime which were propofol-placebo, propofol ephedrine and propofol crystalloid infusion in prevention of hypotension during induction of anaesthesia.

Methods

Study design: It was a randomized double blind study to compare the three different regime which were propofol-placebo, propofol ephedrine and propofol crystalloid infusion for prevention of hypotension during induction of anaesthesia with propofol.

Sample size: Sample size was calculated using EPI Info 6 at 80% study power and α error of 0.05. Sample size came out to be 25 patients in each group which was further enhanced to 30 patients assuming a 10% drop out rate.

Data Collection: Data collection was done with the help of semi-structured pretested proforma and observation of the patients preinduction, postinduction, immediate 01 min.,03min. and 05min after induction.

Approval for the study was obtained from our institutional ethical committee. Ninety patients, classified as ASA physical status I or II, male/female, aged 20-50 years, body weight 45-85 kg, gave written informed consent to participate in this randomized, prospective, double-blinded trial.

All the patients who were scheduled for various elective surgeries under general anaesthesia were included in this study.

Subjects were excluded if they had a history of allergy to the study medication, pregnancy and morbid obesity.

Patients were advised pre-operative fasting for a period of 8 h and were premedicated with tab midazolam 0.1 mg/kg body weight, tab pantoprazole 40mg and tab ranitidine 150mg the night before and 2hr prior to the surgery with sips of water. On arrival in the induction room, an 16-gauge cannula was inserted into a peripheral vein at the dorsum of the hand by the first anesthetist who was not

involved in charting the changes in heart rate and mean arterial pressure. Patients were assigned by pre randomized, sealed envelopes into three study groups and receive the following:

Group C (n=30): Propofol (2mg/kg) and 1ml of normal saline

Group E (n=30): Propofol (2mg/kg) and 1ml of normal saline and ephedrine 70µg/kg.

Group RL (n=30): Propofol (2mg/kg) and 1ml of normal saline and 10ml/kg Ringer Lactate.

Group C (control group) neither any vasoconstrictor medication nor any crystalloid was given .

Group E (Ephedrine group) injection Ephedrine sulfate 70µg/kg was given IV immediately before induction with Propofol.

Group RL (Ringer Lactate) 10ml/kg Ringer Lactate was given 10-15 minutes prior to induction of anaesthesia with Propofol.

Data analysis: ANOVA, Student's T-test and Chi-square test were applied. Results were presented as mean±SD or no. of patients (percent); P value <0.05 defined statistical significant difference.

Results

Table No1. Distribution of the cases according to socio-demographic variable.

Parameters	Group-E(n=30)	Group-RL(n=30)	Group-C(n=30)	p-value(by ANOVA test)	p-value E Vs RL	p-value E Vs C	p-value RL Vs C
Age in years (mean±SD)	33.83±9.42	37.03±11.22	32.83±8.17	0.22	0.41	0.91	0.219
Female:male	10:20	17:13	15:15	0.175	0.14	0.16	0.33
ASA I:II	17:13	16:14	16:14	0.96	0.35	0.24	0.54
Weight in Kgs (mean±SD)	59.67±11.19	64.28±9.28	59.33±9.23	0.120	0.19	0.99	0.15

Table No.2 Distribution of the cases according to Heart Rate

		Mean	Std. Deviation	ANOVA P Value LS	E vs RL	E vs C	RL vs C
PR PRE-INDUCTION	Group E	70.60	8.41	.176	.179	.346	.919
	Group RL	74.40	7.62				
	Group C	73.57	8.60				
	Total	72.86	8.29				
Immediate Post induction	Group E	89.40	9.98				
	Group RL	83.33	8.56	0.001S	.034	.001	.391
	Group C	80.20	9.10				
	Total	84.31	9.90				
One Minute Post	Group E	107.43	12.89	<0.001 S	<0.001 s	<0.001 s	.207
	Group RL	83.63	7.92				

induction	Group C	79.10	9.33				
	Total	90.06	16.10				
3min post Induction	Group E	92.77	10.44	<0.001 S	<0.001 s	<0.001 s	.957
	Group RL	79.07	8.82				
	Group C	78.37	9.40				
	Total	83.40	11.58				
5 Min post Induction	Group E	87.57	11.00	<0.001 S	.004	<0.001 s	.176
	Group RL	79.50	7.95				
	Group C	75.13	9.01				
	Total	80.73	10.65				

Table No.3 Distribution of the cases according to MAP

		Mean	Std. Deviation	ANOVA			
				P Value LS	E vs RL	E vs C	RL vs C
MAPPRE-INDUCTION	Group E	97.57	6.34	.053	.041	.437	.437
	Group RL	93.77	6.23				
	Group C	95.67	5.26				
	Total	95.67	6.10				
Immediate Post induction	Group E	86.10	3.74	.090	.096	.910	.216
	Group RL	88.63	5.47				
	Group C	86.60	4.64				
	Total	87.11	4.75				
One Minute Post induction	Group E	79.93	3.60	.209	.225	.960	.350
	Group RL	81.97	5.98				
	Group C	80.27	4.30				
	Total	80.72	4.76				
3min post Induction	Group E	90.67	4.37	<0.001 S	<0.001 s	<0.001 s	<0.001 s
	Group RL	84.37	5.05				
	Group C	82.60	4.58				
	Total	85.88	5.79				

5 Min post Induction	Group E	82.07	7.30	.021	.030	.060	.956
	Group RL	86.00	5.30				
	Group C	85.57	4.72				
	Total	84.54	6.08				

Discussion

In our study we evaluated three different regime which were propofol placebo,propofol ephedrine and propofol crystalloid infusion for the prevention of hypotension during induction of anaesthesia with propofol.

Approval for the study was obtained from our institutional ethical committee. Ninty patients, classified as ASA physical status I or II, male/female,aged 20-50 years, body weight 45-85 kg, gave written informed consent to participate in this randomized, prospective, interventional study.

All the patients who were scheduled for elective surgery under general anaesthesia were included in this study. Patients were assigned by pre randomized, sealed envelopes into two study groups and received the following:

Group C(n=30): Propofol (2mg/kg) and inj.Normal saline 01ml.

Group E (n=30): Propofol (2mg/kg) and ephedrine 70 ug/kg

Group RL (n=30): Propofol (2mg/kg) and Ringer Lactate 10ml/kg..

Group E (Ephedrine group) injection ephedrine was 70µg/kg given intravenously immediate before induction with propofol(2mg/kg IV. Over 20-30 seconds).

G**roup RL:** 10ml/kg Ringer Lactate was given 10-15 minutes prior to induction of anaesthesia with propofol (2mg/kg i.v. over 20-30 seconds).

Measurements were made before the induction and after induction with propofol at immediate, 01 minute, 3 min. 5min duration. Parameters analyzed were pulse rate(PR) and mean blood pressure (MBP) and percentage change in pulse rate (PR),systolic blood pressure(SBP),diastolic blood pressure(DBP) and mean blood pressure (MBP) from the base line Propofol has been shown to cause hypotension due to its effects of peripheral vasodilatation by increased endothelial production and release of nitric oxide. [15]

The rationale for the prophylactic use of sympathomimetics or crystalloid loading is to attenuate the anticipated decrements in the systemic vascular resistance or to maintain the right ventricular filling pressure respectively. Ephedrine and crystalloid infusion have been previously used safely and studied to combat the systemic hypotension after conduction of neuraxial blocks[16] and high dose of opioid infusion. [17]

In our study, we have demonstrated a significant reduction in the arterial blood pressure after induction of anaesthesia with propofol 10% reduction in SBP observed in previous investigations done by Edelist G. A[18] ,Hugg CC. [19]

Conclusion

In conclusion ,preoperative ephedrine sulphate failed to prevent the delayed post induction hypotension and led to excessive increase in the heart rate that may not be Tolerated In The High Risk Patients..

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